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PENSOFT

The southernmost distribution of the Rhinoceros Snake, *Gonyosoma boulengeri* (Mocquard, 1897) (Reptile, Squamata, Colubridae), in Vietnam

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Abstract

We report the southernmost record of the Rhinoceros Snake, *Gonyosoma boulengeri* (Mocquard, 1897) from Phu Yen Province, southern Vietnam, based on a single specimen collected from forest in the Ca Range. This record extends the distribution of *G. boulengeri* approximately 600 km south of previous records in Vietnam (Quang Binh Province, central Vietnam). A detailed description of a hemipenis is also provided for the first time.

Keywords

Ca Range, hemipenis, range extension, southern Vietnam.

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Introduction

The Rhinoceros Snake, *Gonyosoma boulengeri* (Mocquard, 1897), was described from Bai Tu Long, Hai Phong Province, northeast Vietnam (Mocquard 1897). The species has been recorded in Vietnam from Son La, Thai Nguyen, Vinh Phuc, Ha Noi, Quang Ninh, Ha Tinh, and Quang Binh provinces (Nguyen et al. 2009; Luu et al. 2013) and from Guangxi and Hainan provinces in China (Uetz et al. 2020) (Fig. 1). Although this species was described over 120 years ago, the hemipenis of this species has not been described (Mocquard 1897; Pope 1935; Bourret 1936; Smith 1943).

During a field survey in an evergreen forest in the Ca Range, Phu Yen Province, we collected a road-killed specimen of a colubrid snake with a protruding nasal appendage. Morphological characters of the specimen matched descriptions of *G. boulengeri*. Thus, we provide the southernmost record of the species in Vietnam. In addition, we provided a description of a hemipenis of this species.

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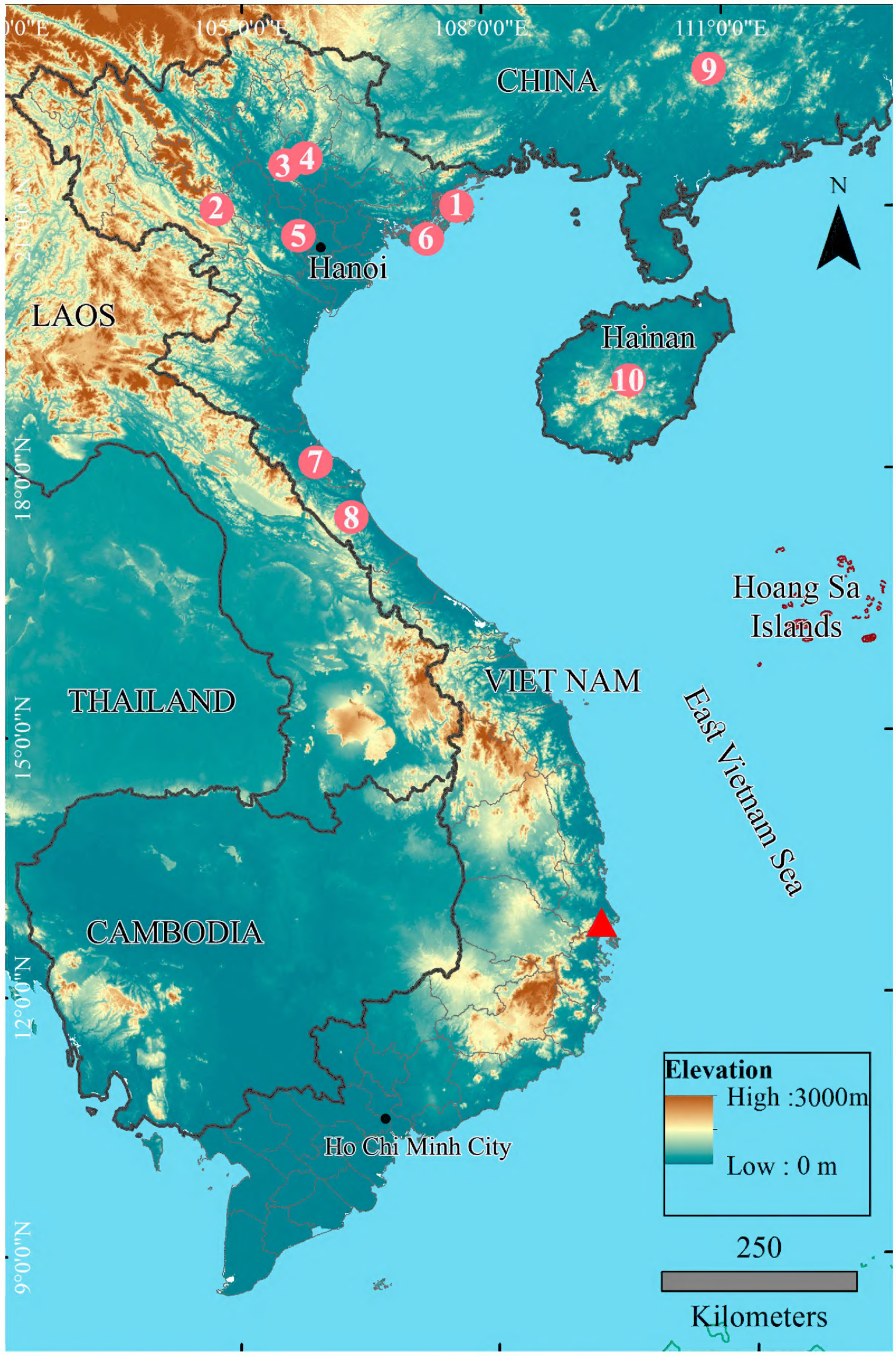

Figure 1. Map showing distribution localities of *Gonyosoma boulengeri*. The previous localities are marked by pink dots and numbered: 1 = Bai Lu Long (type locality) (Mocquard 1897); 2 = Son La Province, 3 = Vinh Phuc Province, 4 = Thai Nguyen Province, 5 = Ha Noi, 6 = Quang Ninh Province, 7 = Ha Tinh Province (Nguyen et al. 2009); 8 = Quang Binh Province (Luu et al. 2013); 9 = Guangxi Province, and 10 = Hainan Province, China (Uetz et al. 2020). The new record in Phu Yen Province is marked by red triangle.

Methods

Fieldwork was conducted between 21–30 March 2019 in the Ca Range, Song Hinh Protected Forest, Song Hinh District, Phu Yen Province, southern Vietnam. A freshly road killed specimen was collected, photographed, then fixed in 95% alcohol for 24 hours and subsequently deposited in the zoological collection of Institute of Tropical Biology (ITBCZ), Ho Chi Minh City, Vietnam.

Measurements of snout to vent length and tail length were taken with a measuring tape to the nearest 1 mm and other measurements were taken with digital calipers

to the nearest 0.1 mm following Nguyen et al. (2017) and Smith (1943). For the hemipenis description we follow the terminology of Dowling and Savage (1960). The left hemipenis was everted to facilitate description, the right one was kept in situ in order to count the caudal plate that the hemipenes reached. Bilateral scale counts were given as right and left.

Results

Material examined. VIETNAM • 1 ♂; Phu Yen Province, Song Hinh District, Song Hinh Commune; Song Hinh Protected Forest; collected on the road in forest near Lanh Stream, Ca Range; 12°47.12′N, 109°02.24′E; alt. 350 m; 25 Mar. 2019; M.V. Le, H.V. Lo, L.T. Nguyen, and T.T. Nguyen leg.; ITBCZ 4506.

Identification. An adult male, slightly damaged due to traumatic injury probably caused by a vehicle, body elongated, snout to vent length 750 mm; tail length 324 mm, total length 1074 mm. Head very distinct from neck (head length 40.5 mm, head width 15.7 mm, and head height 11.3 mm); eye slightly larger than interorbital distance (eye length 4.5 mm; interorbital distance 3.8 mm), pupil rounded; the presence of a long pointed nasal appendage covered with small smooth scales (snout length including nasal appendage 10.4 mm); internasal scales much smaller than prefrontal scales; single loreal scale, longer than wide; a single preocular scale and postocular scale in both sides of the head; temporals 2+2/ 2+3; supralabials 9/9, the fourth to sixth supralabial scales in contact with the eye; infralabials 11/11; body scale rows 19-19-13, very weakly keeled; ventral scales with strong angulation laterally, 207 scales; subcaudal scales paired, 122 pairs and angulate laterally, same as the ventrals; cloacal plate divided.

Coloration in life: dorsal surface of head and body olive green, ventral surfaces including the labial scales and underside of head paler green, a yellowish line along lateroventral edge (Fig. 2). In preservative, dorsal surfaces turned to blackish blue and ventral surface turned to whitish blue.

Description of the left everted hemipenis: 28.3 mm in length (measured after eversion), single, subcylindrical organ that extending to the 11th caudal plate; sulcus spermaticus is simple and oblique; the base of the hemipenis (⅓ of the length) naked with differentiated ornamentation; distal ⅓ is calyculate, the calyces being small and with papillated edges and decreasing in size at tip; the middle ⅓ spinose, the longest spines located at the middle of hemipenis; spines decreasing in length towards the base of the hemipenis (Fig. 3).

Morphological characters of our specimen are broadly congruent with previous descriptions of *Gonyosoma boulengeri* (Smith 1943; Hecht et al. 2013; Luu et al. 2013) except for the ventral scale count, which was 207, fewer than that of 221 from a male specimen found 950 km to the north at Tay Yen Tu nature Reserve in Bac Giang Province (Hecht et al. 2013), and dorsal scale rows 19-19-13 instead of 19-19-15 (Smith 1943; Hecht et al. 2013)

Discussion

Our record of *Gonyosoma boulengeri* in Phu Yen Province extends the species' distribution approximately 600 km from the nearest previous record (Phong Nha-Ke Bang National Park, Quang Binh Province, central Vietnam; Luu et al. 2013). In addition, this is the first description of the hemipenis of the species.

This species is not commonly observed in the wild, but it is commonly maintained by herpetoculturists (Kane et al. 2017). Although our specimen was most probably killed by vehicle on a small trail in the evergreen forest of Song Hinh Protected Forest, it is very far from the nearest village. We believe that it is a wild specimen and not an escaped captive specimen. The forest trail had been constructed by local people to provide access to the forest for hunting and for the collection of forest products (lumber and fruits).

The forest of Ca Range in Phu Yen, Khanh Hoa, and Dak Lak provinces habours many endemic or recently described species: *Leptobrachella macrops* (Duong, Do, Ngo, Nguyen & Poyarkov, 2018); *Acanthosaura murphyi* Nguyen, Do, Hoang, Nguyen, Mccormack, Nguyen, Orlov, Nguyen & Nguyen, 2018; *Cyrtodactylus cucdongensis* Schneider, Phung, Le, Nguyen & Ziegler, 2014; *C. kingsadai* Ziegler, Phung, Le & Nguyen, 2013; and *Cuora picturata* Lehr, Fritz & Obst, 1998 (Uetz et al. 2020). Furthermore, this is the only known location for *Lycodon cardamomensis* Daltry & Wüster, 2002 in Vietnam (Do et al. 2017). Our record of *G. boulengeri* fill the knowledge gap of this regions' herpetofauna and showed that further work is needed to elucidate the actual diversity of the herpetofauna of the Ca Range.

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Figure 2. *Gonyosoma boulengeri* from Phu Yen Province, freshly killed specimen (vehicle collision). **A.** Dorsal view. **B.** Ventral view. **C.** Dorsal view of head. **D.** Ventral view of head. **E.** Lateral view of head. Scale bars: A, B = 20 mm; C–E = 10 mm.

Authors' Contributions

LTN, MVL, and TTN collected material in the field; LTN and DK wrote the manuscript; HVH, TEMM, BT, and SNN reviewed the manuscript.

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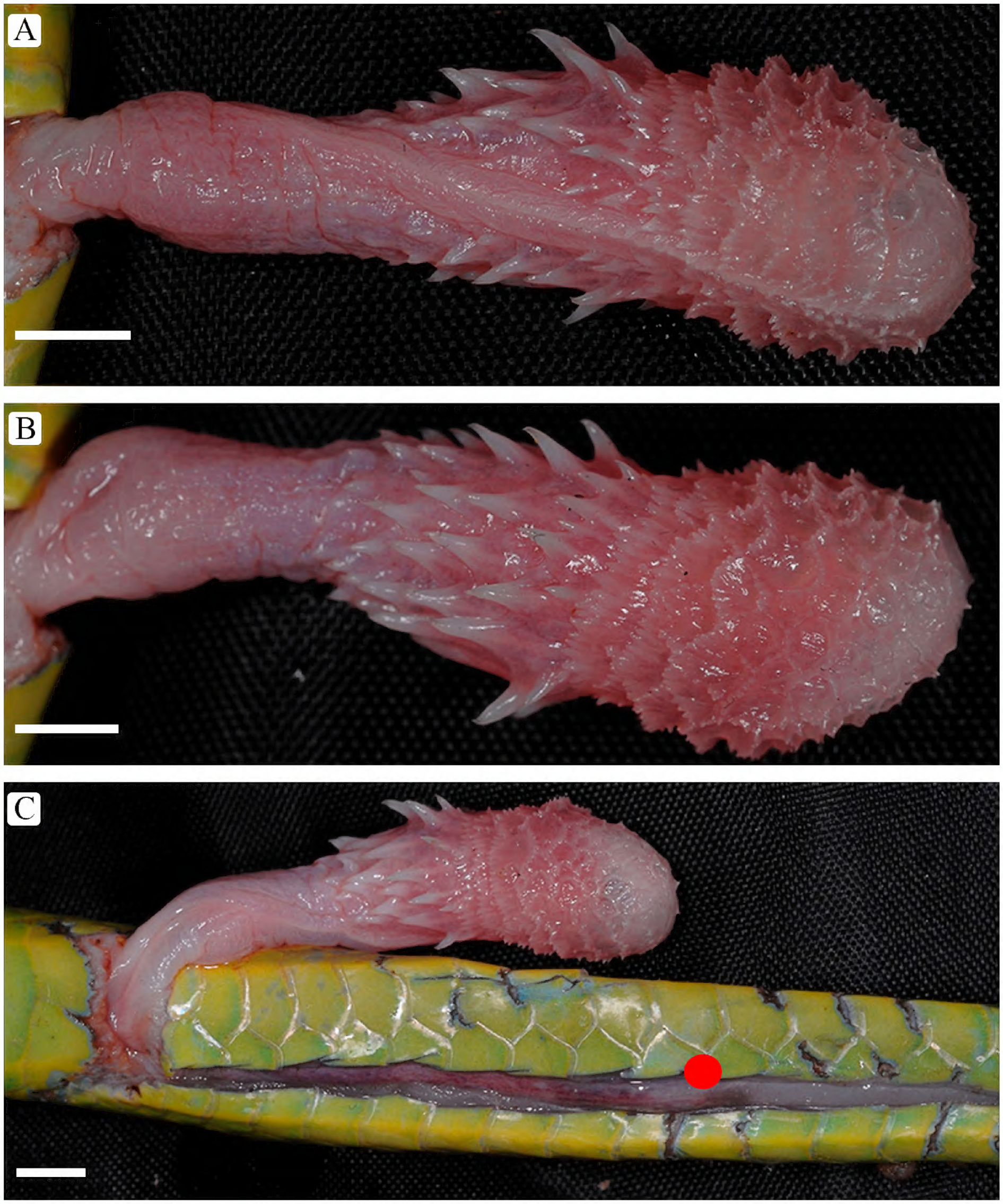

Figure 3. Fresh left everted hemipenis of *Gonyosoma boulengeri* from Phu Yen Province. **A.** Sulcate view. **B.** Asulcate view. **C.** Hemipenis extend to the 11th subcaudal scale (red dot). Scale bar = 2 mm.

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